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PLANT MORPHOLOGY AND TAXONOMY.[1]

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The history of botany, so far as the authentic and correct record of facts and observations is concerned, like the history of the other descriptive natural sciences, may be said to date from the fifteenth and sixteenth centuries. While it is true that the works of the older writers, like Theophrastus, Dioscorides, Pliny and Galen, contain matter of historical interest, still from the modern scientific point of view they can scarcely be regarded as more than curiosities.

With the discovery by Copernicus that the earth is not the center of the universe, and with the revival of learning in the fifteenth and sixteenth centuries, there was an awakening in scientific investigation and the dawn of a new era in thought. This was the period of which Pater writes. He says:—

"But it is in Italy, in the fifteenth century, that the interest of the Renaissance lies, in that solemn fifteenth century which can hardly be studied too much, not merely for its positive results in the things of the intellect and the imagination, its concrete works of art, its special and prominent personalities, with their profound aesthetic charm, but for its general spirit and character, for its ethical qualities of which it is a consummate type."

If we trace the history of the study of botany and of its different divisions, we find that taxonomy or classification preceded morphology as a distinct branch, but morphology being the basis of taxonomy, that is, one of the factors upon which the taxonomist

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depends, morphology should rightly precede taxonomy, and I have therefore chosen first to consider the subject of morphology and afterwards to endeavor to show its relation to taxonomy.

MORPHOLOGY.

Before considering the modern meaning of the word morphology, it may be well, on an occasion like this, briefly to refer to some of the important steps in the evolution of this part of the study of botany.

While Cesalpino (1583), an Italian botanist, was termed by Linnaeus, the first systematist, he having furnished the first formal classification of plants, he was also among the earliest research workers in botany and may be regarded as the founder of plant morphology. He furnished very many excellent observations on the different parts of plants, such as the nature of tendrils, the position of leaves on the stem, the development of fruits, and the arrangement of seeds.

In contrast to the older botanists or herbalists of Germany, Cesalpino tried to discern the significance of the different parts of the plant, but was handicapped by the Aristotelian mode of treating natural phenomena still in vogue. His contemporary, or successor, the German scientist Jung was, however, an opponent of scholasticism, and in his studies in comparative morphology may be said to have introduced the positive method of investigation.

The demonstration of the sexuality of plants by Camerarius, in 1691–1694, must always rank as one of the most important contributions to the science of botany. Nearly a century later Camerarius's observations were extended and confirmed by Koelreuter (1761–1766), whose experiments in hybridization have become classical, and by Sprengel (1793), the results of whose work in cross-pollination and the study of the relation of insects to flowers, were used to such excellent advantage by Darwin in 1859. In addition, Gärtner not only contributed to our knowledge of fertilization, but devoted much time to the consideration of the morphology of fruits and seeds, and in his great work, published in 1788, gave descriptions and illustrations of the fruits and seeds of more than a thousand species. Another of the results of his work was the discovery that the spores of the Cryptogams differ from the seeds of the higher plants in that they do not contain a well defined or developed embryo.

While the seventeenth century is marked by the important discovery made by Camerarius, the eighteenth century is especially noted for the establishment of the doctrine of epigenesis. In 1759 Kasper Friedrich Wolff showed in a dissertation on the Theory of Generation, that instead of the young organism being preformed in the egg, as had been previously maintained, it is gradually developed from the substances contained therein. Wolff's extensive studies on the development of both animals and plants entitle him to the distinction, given him by Goebel, of being the founder of the history of development, or, in other words, he may be regarded as the founder of our modern ontogenetic method of study. To Wolff also belongs the credit of discovering the vegetative point (*punctum vegetationis*) in plants, which is one of the distinguishing marks between the higher plants and animals.

In the early part of the nineteenth century De Candolle proposed a natural system of classification of plants, and by many this is considered to be his most enduring work. While this may be true it should not be forgotten that his system was based upon extensive morphologic work, and his doctrine of the symmetry of plants embodied a series of morphological observations which still hold true. De Candolle was able to a large extent to free himself of the erroneous teachings of the past, and was among the first, as pointed out by Darwin, to show that species are not immutable creations. In spite of certain inconsistencies in De Candolle's work, Sachs says that to him "belongs the merit of being the first to point emphatically to the distinction between morphological and physiological marks, and to bring clearly to light the discordance between morphological affinity and physiological habit."

Notwithstanding the far-reaching importance of the researches of Wolff, up until this time no one appears to have appreciated the necessity of a study of the successive stages of development of the organs of plants in botanical work, it being the custom of the time to devote attention to mature organs only. To Robert Brown (1825) belongs the credit of developing and establishing the ontogenetic method in the study of plants, that is, the study of the development of the individual beginning with the germination of the seed or spore, and which now constitutes one of the most important lines of investigation. During the course of his investigations on the organs of fructification in the Cycads and Conifers he

was able to show the close relation of these groups, and to demonstrate the value of such studies in establishing a scientific taxonomy.

Contemporaneous with De Candolle and Brown was Goethe (1790), the German poet and naturalist, who promulgated the doctrine of metamorphosis, whereby he "derived all the different species of plants from one primitive type, and all their different organs from one primitive organ—the leaf." Following the lead of Wolff there was a tendency to reduce the plant to only two parts, namely, stem and leaves, the parts of the flower being considered modified leaves and the root a modification of the stem. While it is generally conceded that in the evolution of plants the development of leaves preceded that of flowers; still we now look upon the flowers as arising independently and not as being derived from the leaves. That this is true seems also to be borne out by the fact that in many plants, particularly trees, the flowers appear before the leaves. While it is unfortunate that the doctrine of metamorphosis was taken up by the "nature philosophers" and made more or less ridiculous by their speculations, and while the evolutionary ideas of Goethe, as pointed out by Haeckel, like the analogous ideas of Kant, Owen, Treviranus and other philosophers at the commencement of the nineteenth century, did not amount to more than certain general conclusions, the great merit of Goethe's work lies in the fact that he was among the first to appreciate the value of the study of the living plant. He not only introduced the word "morphology," but has also given us a definition of the term. He says:—

"Scientific men in all time have striven to recognize living bodies as such, to understand the relations of their *external, visible, tangible* parts, and to interpret them as indications of what is within, and thereby in some measure to gain a comprehensive notion of the whole. . . . We find therefore in the march of art, of knowledge, and of science, many attempts to found and construct a doctrine which we may call morphology."

While Goethe gave us a new point of view in the study of the biological sciences, Wolff, De Candolle, Brown and others laid the foundations for the morphological study of plants, which was brought to such perfection under the guidance of Nägeli, Hofmeister and others about the middle of the last century.

In the work of Jung, which has already been referred to, we see how the mathematical bent of his mind enabled him to give not only

clear definitions, but to recognize a certain symmetry in the forms of stems and leaves. It was not, however, until the time of Schimper (1834) and Braun (1835) that mathematical conceptions with regard to plant members were formulated and made the basis of morphological study. Schimper introduced a system of phyllotaxy, known as the spiral theory, the principal feature of which was the assumption of the spiral arrangement of leaves. While the theory is a beautiful one on paper, it has been found in practice to have a limited application, and can not be said to account for the factors which influence the arrangement of leaves, as pointed out by Hofmeister. Its chief value lies in the fact that it directed attention to the study of the relative position of organs and caused botanists to inquire into the factors influencing their form, position, and arrangement on the plant. It possibly also led to the application of mathematical and mechanical principles in the study not only of the disposition of organs but also in the distribution of tissues as illustrated in later years in the work of Schwendener and his students. At any rate it is interesting to make mention here of Schwendener's great work on the mechanics of growth, which must be looked upon as a most important contribution to the study of the fundamental principles of morphology.

We now come to a period which was marked by a series of brilliant investigations, and which has been one of the most fruitful in the history of botanical science. In 1838 Schleiden announced the fact that the cell is the fundamental unit in plants and showed that all the different tissues of the plants are combinations of cells. Several years previous (1831) Robert Brown had discovered the nucleus in the epidermis of the orchids, and it remained for Von Mohl (1846) to give the first accurate description of protoplasm and to establish its fundamental nature.

In contrast to the cellular theory established by Schleiden and his followers, which appeared to be all-sufficient for so long, we now (1892–1895) have the conception that the energids are the fundamental units in the plant structure; an energid, according to Sachs, being composed of a single nucleus and the protoplasm which it dominates. Thus a cell may be monergic or polyergic, depending upon the number of nuclei which it contains.

It was also during the middle period of the last century that Nägeli carried on his splendid researches on the development of

cells and showed by his studies on the starch grain and cell-wall how intricate and far-reaching the problems of morphology are. Von Mohl's studies on the nature and distribution of tissues in plants, together with the work of Hanstein and others, laid the foundation upon which De Bary in 1877, together with his own researches, wrote his book "The Comparative Anatomy of the Vegetative Organs of the Phanerogams and Ferns," which is still a recognized authority.

It was during these same years that the series of investigations on the mode of reproduction in plants was begun, which culminated in the brilliant results obtained by Hofmeister, and which has been carried on with increasing interest even to the present time. The work begun by Brown on the mode of fertilization in the Phanerogams was carried to completion by Amici in 1846. The work of Bischoff, Mirbel, Unger and Nägeli on the male sexual organs in the Archegoniatae was supplemented by that of Hofmeister, who discovered the archegonia or female organ of reproduction and who thus gave the first authentic description of the mode of fertilization in the lower plants. His work also brought to light one of the most interesting discoveries in the whole realm of botanical science —namely, the alternation of generation in plants. Hofmeister extended his studies to the Conifers and Angiosperms, and thereby not only established the affinity between these two groups, but showed their genetic relation to the Pteridophytes, and thus contributed a series of the most important researches to what has now come to be known as phylogenetic morphology, or the study of the origin and relation of the various plant groups.

During the period between 1850 and 1860 the discovery of the alternation of generation in plants was further confirmed by Hofmeister's work on the Equisetaceae, Isoetes, etc., and by the investigations of Pringsheim, Cramer, Mettenius and others on other Pteridophytes.

Considerable light was thrown on the nature of fertilization in the Algae by the fortunate discovery by Thuret (1854) of the process as it takes place in Fucus. This was followed by Pringsheim's studies on Vaucheria, in 1855. It remained for De Bary to study the fungi, and he proved himself to be one of the greatest masters in botanical science. He originated methods by which the developmental history of these organisms could be studied, and at the same time showed their relation to their hosts.

In considering the history of the morphological study of plants, mention should be made of the important work which was carried on by Sachs (1858–1875). By the introduction of his method of plant cultures and apparatus for controlling the conditions under which plants grow he not only contributed to our knowledge of plant physiology, but also made many observations having a bearing on experimental morphology. The methods used by Sachs have been extended and perfected in recent years, and in the hands of Goebel and other investigators have yielded results which have materially assisted in raising plant physiology and plant morphology to the high plane which they now occupy, and which furthermore show the interdependence of these two divisions of botanical science. In the same manner have the methods of research instituted by De Bary yielded such fruitful results in the hands of Klebs and others in their studies on the lower orders of plants.

Following Hofmeister, who may be regarded as the founder of experimental morphology, Sachs did very much to give direction to the newer morphology which has been developed, particularly in the past fifteen or twenty years.

Sachs was, however, a representative of what may be considered a transition period between the older formal morphology which considered the external configuration of plants independent of their function and physiological activities, and the newer morphology which considers that the form and function of an organ stand in the most intimate relation to each other. In the chapter on "Morphology of the External Conformation of Plants," as given in his text-book of botany, Sachs says:—

> The parts of plants which are ordinarily termed their organs, very various in their form and serving different physiological purposes, may be considered scientifically from two different points of view. The question may be asked at the outset: How far are these parts adapted, by their form and structure, to perform their physiological work? In this case they are regarded from one side only as instruments or organs, and this mode of regarding them is itself a part of physiology. Or else these relationships may, for the time, be completely put aside, and the question may be kept out of consideration what functions the parts of the plant have to fulfil, and the only point kept in view may be where and how they arise, in what manner the origin and growth of one member are related in space and time to those of another. This mode of regarding them is the morphological one. It is obvious that this mode is as one-sided as the physiological; but investigation and description require,

here as everywhere else in science, abstractions of this kind ; and they are not only not hurtful, but even of the greatest assistance to investigation, if the investigator is only clearly conscious that they are abstractions.

It is thus seen that Sachs even during the most active period of his life not only admitted the propriety of separating the consideration of function from the study of morphology, but claimed that there was an advantage in so doing. As a basis for morphological investigation Sachs suggested the following lines of study: A study of the development of parts, that is the development of members or organs; their mutual positions; the relative time of their formation; and their earliest stages. From the modern point of view he has left out the most important factor in the study of morphology, namely, the study of the relation of the form and function of organs. In other words his proposition might be likened to an equation in chemistry in which one of the factors is left out. It is fortunate, however, that Sachs later changed his views with regard to this subject, for, as pointed out by Goebel, the teaching of such abstractions has led to one-sidedness and incorrect generalizations.

TRUE MORPHOLOGY OR ORGANOGRAPHY.

According to the morphology of to-day the structure of an organ has a direct relation to its function, or, in other words, structure is modified by function, and the two can not be separated if we desire to treat the subject comprehensively.

Herbert Spencer was among the first to insist upon the necessity of the study of function in connection with that of structure. He says :—

The division of morphology from physiology is one which may be tolerably well preserved, so long as we do not carry our inquiries beyond the empirical generalizations in their respective phenomena ; but it is one which becomes in great measure nominal, when the phenomena are to be rationally interpreted. It would be possible, after analyzing our solar system, to set down certain general truths respecting the sizes and distances of its primary and secondary members, omitting all mention of their motions ; and it would be possible to set down certain other general truths respecting their motions, without specifying their dimensions or positions, further than as greater or less, nearer or more remote. But on seeking to account for these general truths, arrived at by induction, we find ourselves obliged to consider simultaneously the relative sizes and places of the masses, and the relative amounts and directions of their motions. Similarly with organisms. Though we may frame sundry comprehensive

propositions respecting the arrangement of their organs, considered as so many inert parts; and though we may establish several wide conclusions respecting the separate and combined actions of their organs; without knowing anything definite respecting the forms and positions of their present organs; yet we can not reach such a rationale of the facts as the hypothesis of evolution aims at, without contemplating structures and functions in their mutual relations. Everywhere structures in great measure determine functions; and everywhere functions are incessantly modifying structures. In nature the two are inseparable co-operators; and science can give no true interpretations of nature without keeping their co-operation constantly in view. An account of organic evolution in its more special aspect, must be essentially an account of the interactions of structures and functions, as perpetually altered by changes of conditions.

At the present time Goebel probably stands as the chief exponent of the newer morphology. In his book on the organography of plants he has presented some of the arguments in favor of this newer conception in regard to plant structures, and in a most characteristic and clever manner has substituted the word "organography" for that of "morphology," and thus frees himself of the older conceptions in regard to the subject, and at the same time adopts a more expressive term. According to Goebel the morphologist should look upon the form of plants as an expression of living processes. He should endeavor to determine in what degree the form of an organ shows an adaptation to external conditions and to what extent it is dependent upon these and internal conditions. To make a practical application of his meaning, Goebel says that he considers it infinitely more important to determine the factors which cause the inequilateral development of a leaf, as of begonia, than to construct a phylogenetic hypothesis unsupported by facts, and in summing up his arguments on the subject of morphology, or organography, he says:—

The idea that morphology has nothing to do with the function of organs has been acquired entirely because the fact has been overlooked that the transformations seen in organs are conditioned by a *change of function*. Their functions therefore have been treated as subordinate in determining the characters of organs, and the external relations alone have been taken as the chief points for consideration. But the relationships of mere form are by no means the permanent ones 'in the tide of phenomena.' They also change. The determination of this change, that is to say, of the alterations which have taken place, and are believed to take place, in the formation of organs of a natural group, is one of the weightiest tasks of organography. If we separate function from form we are at once led into altogether unfruitful speculations.

We thus see that morphology has become a science, which is not merely concerned with the form and structure of organs, but is more especially concerned in the study of the factors which influence form and structure, and it is therefore not only one of the most interesting departments of biological science, but may be regarded as its very soul, as pointed out by Darwin. According to Goebel there are two branches of experimental organography to be considered:

(1) The reciprocal influence of organs upon one another, which is termed *correlation.*

(2) The influence of external factors, which are designated by Herbst as *formative stimuli.*

The reciprocal influence of one organ upon another may be either *quantitative* or *qualitative,* although there is no sharp distinction between the two. In quantitative correlation certain primordia are suppressed while others apparently develop and enlarge at their expense, as for example, it is a common occurrence for most of the ovules to be entirely suppressed while the available nutritive material is used in the development of the few remaining ones, as in the horsechestnut. In qualitative correlation an organ may assume a different direction, and even the function of another part, if this be injured, removed or arrested in its development. As an example of this Goebel mentions that the transformation of the leaflets of pea may be hindered by removing other leaflets. This plasticity is not confined to any one organ, but is more or less characteristic of all parts of the plant by reason of certain latent properties of the protoplasm. The external factors influencing the development of organs may be enumerated as follows: Light, moisture, temperature and gravity, and those of a purely mechanical nature as well.

As a result of the studies in experimental morphology, or experimental organography, as it is termed by Goebel, certain underlying principles have been deduced, to which attention should be directed. These were brought out in an excellent paper on "The Cardinal Principles of Morphology," read before the Society for Plant Morphology and Physiology, in 1900, by Professor Ganong, who was a student of Goebel's.

The principles formulated by Professor Ganong are as follows:—

(1) The Continuity of Origin.—No functional structure ever arises *de novo,* but only from the modification of a pre-existing structure.

(2) Opportunism.—The direction taken in metamorphosis is not determined

by obedience to any preformed plan, but, except for the influence of the inertia of the heredity of the particular part, follows the factors potent at the moment.

(3) Functional Domination.—In metamorphosis it is function which takes the lead and structure follows.

(4) Indeterminate Anatomical Plasticity.—In all anatomical characters (size, shape, number, position, color, and cellular texture) plant-organs are not limited by anything in their morphological nature, but under proper influence may be led to wax and wane indefinitely in any of these respects.

(5) Metamorphosis Along lines of Least Resistance.—When through a change in some condition of the environment, the necessity arises for the performance of a new function, it will be assumed by the part which happens at the moment to be most available for that purpose, regardless of its morphological nature.

(6) Metamorphosis by Transformation.—Since all parts of the plant actually are organs, new organs can arise only by the transformation of previously existing ones.

(7) Gradation in Morphological Membership.—In the progressive development of metamorphoses, difference of degree passes over gradually into difference of kind.

TAXONOMY.

It will not be possible in the scope of this paper to trace the history of taxonomy with the same detail that was done under morphology. Nor does this appear to be necessary, for, as pointed out at the beginning of this paper, taxonomy is dependent upon morphology, and therefore the history of the latter is to a greater or less extent the history of the former, although this is not strictly true.

The older systems of classification were called artificial because they took into consideration only the superficial and gross characters of plants, while the aim of the so-called natural systems has been to group plants according to their essential or fundamental characters. But as a matter of fact our natural systems are more or less artificial or conventional because of our imperfect knowledge of plants.

Practically speaking, our interest in taxonomic work dates from the time of Linnaeus, who was an all-round naturalist, and in his *Systema Naturae* (1731) gave a classification of plants and animals so far as they were known to him. While Linnaeus's system was an artificial one, the main divisions being based upon the characters of the stamens and pistils, still he recognized the necessity for a natural system and even proposed one, although he did not follow it in practice. To him we are also greatly indebted for the development of

the binomial system of nomenclature. In Tournefort's system (1693) of classification the genera were considered to be the units, and while Linnaeus at first agreed with this, he later came to regard the species as distinct creations and therefore the units in systematic work.

While it has been pointed out that Linnaeus's belief in the immutability of species was the one great defect of his teaching, still, considering the fragmentary knowledge of plants and the more or less chaotic condition of taxonomy at that time, it is doubtful if his work would have been any more accurate than it was had he not been dominated by the dogma of the creation of distinct species. But of course it should not be forgotten that the harm which lies in erroneous doctrines or teachings is the influence which they have on subsequent thought and work, and Linnaeus being such a high authority it is no doubt due largely to his influence that the belief in the fixity of species prevailed with more or less force until the appearance of Darwin's Origin of Species, in 1859.

We are confirmed in this latter conclusion by the fact that when Jean Lamarck, in 1809, clearly showed that species are not immutable, his views were opposed by nearly all of the highest authorities and were practically buried for fifty years. Lamarck showed that the organism was modified by its environment and that the existing complex forms were derived from simpler ones, and it only remained for Darwin to supply the remaining element in the theory of descent, namely, the principle of natural selection.

Darwin's views were backed by such a mass of empirical data and the time being ripe for the promulgation of his doctrine of evolution, they were not long in gaining a following, and, as is now well known, marked the beginning of a new epoch in biological science.

As pointed out by De Vries, Darwin recognized two possibilities with regard to the origin of species, the one being the sudden and spontaneous production of new forms from the old stock, and the other being "the gradual accumulation of those always present and ever fluctuating variations which are indicated by the common assertion that no two individuals of a given race are exactly alike." The view founded upon the supposition that individual fluctuations constitute the chief factor in organic evolution gained the ascendancy in the start, this view being accentuated by Darwin himself and supported by Wallace as the exclusive factor because there was more evidence in favor of it.

De Vries, on the other hand, as a result of his own experiments and those of others, claims that new species arise by discontinuous variations, as termed by Bateson, or by mutations—that is, the sudden appearance of new characters—as termed by De Vries, who even goes so far as to state that species and varieties are not known to originate in any other way at the present time. De Vries considers that there are periods of mutation when new species suddenly make their appearance, or the type may remain constant for many, or perhaps even hundreds of years without the appearance of a new species, although it is claimed that the periods of mutability and stability alternate more or less regularly.

In considering the subject of species and varieties it is essential to make a clear distinction between specific and varietal marks, and mere individual variations or fluctuations, such as differences in size, color, etc.

The true significance of this tendency to variation on the part of individual plants, while better understood by the horticulturist and experimental morphologist, is not always appreciated as it should be by the systematist, and he has attached more importance to these fluctuations than he should have done. It thus comes about that frequently transient and trifling characters are made the basis of taxonomic work.

While I have no intention of attempting to indicate the lines along which taxonomic work should proceed, I may be permitted at this time to indicate one or two of the tendencies which are coming to the front in the determination of species. De Vries, in his recent book clearly shows what is meant by species and has suggested a way by which we may determine species with certainty.

As is pretty well understood, there are two main lines of organic evolution at large, namely, progression and retrogression. With these principles in mind we are able to appreciate what constitutes a new species or variety. When a species arises which exhibits entirely new characters or characters different from its ancestors, and remains constant for some years, it is considered to be a new species. When a species shows a loss of some usually superficial character, this constitutes a variety, or, more properly, a retrograde variety. A species which has acquired some characteristic of an allied form likewise constitutes a variety.

While species are considered to be the true units in organic life, there is still much uncertainty as to what constitutes a species, as already indicated, and, furthermore, it has been shown on experimental grounds that many systematic species, "as they are accepted nowadays, are as a rule compound groups. Sometimes they consist of two or three, or a few elementary types, but in other cases they comprise twenty, or fifty, or even hundreds of constant and well differentiated forms." It is interesting to note in this connection that while Linnaeus held to the view that species were distinct creations, he nevertheless recognized the compound nature of the then existing species.

According to De Vries the real units are the elementary species; their limits often apparently overlap and can only in rare cases be determined on the sole ground of field observations. He then goes on to say that pedigree-culture is the method required and that any form which remains constant and distinct from its allies in the garden is to be considered as an elementary species.

To obviate the difficulties which would arise from the multiplication of species, their numbers being already cumbersome, De Vries suggests the recognition of two sorts of species. He says: "The systematic species are the practical units of the systematists and florists, and all friends of wild nature should do their utmost to preserve them as Linnæus proposed them." On the other hand, he maintains that "both for the theory of descent and for our conception of systematic affinities at large," a study of elementary species is essential. "For it is obvious that they only can be observed to originate, and that the systematic species, because they are only artificial groups of lower unities, can never become the subject of successful experimental inquiry."

For some time past, in the study of certain of the cryptogams, as bacteria, yeasts and fungi, there has been a disposition to rely upon physiological rather than morphological characters, this being due not only to the fact that these are more constant and characteristic in these organisms, but also to the fact that distinct morphological characters are entirely wanting in some cases. While the necessity for this additional study in the higher plants is not so apparent on account of the presence of well-defined morphological characters, still the value of physiological marks as one of the bases of classification

is coming to be recognized. The best illustration of this is to be found in the monograph on the genus Eucalyptus by Baker and Smith. They say:—

When this research was first started it was intended to follow the usual morphological systematic classification of previous botanists; but as the work progressed it was found that nothing definite could be arrived at if such a course were followed.

By working on morphological grounds alone it was found that many of the so-called individual species possessed different barks, timber, oils, dyes, etc., a state of things which quite differed from our definition of a species, and consequently, such an artificial system (as this research appeared to prove it) had to be discarded, and what is apparently a more real or natural system of classification had to be adopted, viz., founding a species, not on morphological characters of dried material alone, but on :

(1) A perfect field knowledge of the trees.
(2) The nature and character of their barks.
(3) The nature and character of their timbers.
(4) Morphology of their fruits, leaves, buds, etc.
(5) Chemical properties and physical characters of the oils, dyes, kinos, etc., and any other evidence, such as histology, physiology, etc., that will assist in establishing differences or affinities of species.

Our experience shows that a species so founded is practically constant in specific characters, however great the range of distribution may be.

It is thus seen that in both morphological and taxonomic work, experimental and physiological studies are coming to be recognized more and more as of fundamental importance, and that the old comparative method alone is no longer adequate in dealing with the problems which confront either the morphologist or taxonomist. It is apparent that a large amount of research work along various lines is necessary to establish species with certainty, unless indeed recourse be had to physiological studies and pedigree cultures alone, which are not less laborious.

While lack of thoroughness in both morphological and physiological investigations is no doubt partly responsible for the confusion existing in systematic work, still there has been another factor which has been more or less demoralizing, and this is the manner in which the nomenclature question has been handled in recent years. To say the least, our system of nomenclature is truly mediæval. When we think of the efforts of Linnaeus to simplify botanical nomenclature, we cannot but wonder what he would think, were he living, of the botanical names of to-day, burdened as they

are with authors' names; or of the fact that the mere discovery of an error in the spelling of a botanical name may entitle the discoverer of the error to attach his name to the plant name in addition to that of the original author. Professor Bailey has well defined our position with regard to taxonomy and nomenclature. He says:

> Our ideas of what constitutes species and varieties are free and extensible nough, but our methods of designating those ideas still follow the formalism of a century ago—are in fact more inflexible than they were in the time of Linnaeus. If nomenclature is inelastic, schemes of classification within the genus or species must likewise be inelastic, for the classification is but an expression of our ideas of the relationships of the objects that we name. Our nomenclature does not express either the knowledge or point of view of our time.

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INTERNATIONAL BOTANICAL CONGRESS.[1]

The second International Botanical Congress was held at Vienna, June 11–18, 1905, and was highly successful in every way. There was a large and unusually representative attendance, the list of members containing about 600 names. Deducting ladies registered with husbands or relatives, and the considerable number of amateurs from Vienna and the neighborhood, it is certainly safe to say that there were present nearly 400 professional botanists. Of that number nearly one-half would be known by name to any one familiar with botanical literature, and among these were many whose reputation is world-wide. Naturally Austria was most numerously represented, but Germany sent a large contingent, and nearly all the European countries were represented, except perhaps those of the Iberian and the lower Balkan peninsulas. The English were few—a half-dozen at most. Sixteen American botanists were present: Arthur, Atkinson, Barnes, Barnhart, Blakeslee, Britton (Mr. and Mrs.), Brown, Campbell, Coville, Duggar, Robinson, Shear, Trelease, Underwood, and Woods. But American societies were sadly negligent, and many were unrepresented which might have delegated authority to some of the sixteen.

The Congress was opened in the Festsaal of the University by Wiesner, with addresses of welcome by the minister of agriculture, speaking for the Emperor; by the burgomeister, for the city; and by the rector, for the university. Bonnet, secretary of the Paris Congress, gave a historical statement of the organization of the present congress, and Reinke (Kiel) delivered an address on "Hypothese, Voraussetzungen, Probleme in der Biologie."

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[1] This interesting and concise account of the proceedings of the Vienna Congress by Prof. Charles R. Barnes, is reprinted from the July number of the *Botanical Gazette*.

The proceedings, particularly as they relate to botanical nomenclature, are not only of interest to botanists, but are also of interest to pharmacists, as the true botanical origin of drugs is a question in which they are especially concerned. Fortunately, the botanical nomenclature adopted in the Pharmacopœia has not been unduly influenced by the more radical views on this subject. In following Engler and Prantl, in the main, the botanical nomenclature of the new Pharmacopœia is thus in line with the action of the congress just closed, and further changes in nomenclature are not likely to be made until after the meeting of the Pharmacopœial Convention in 1910.—EDITOR.

In the afternoon the Nomenclature Conference organized in the hall of the Museum in the Botanical Garden by electing as President, Flahault; as Vice-Presidents, Rendle and Mez; and three secretaries; received the report of the standing committees and of the Rapporteur-Général (Briquet); and adopted rules of procedure. The report of the Commission was presented as a quarto of 160 pages, having the text of the code of 1867 in the first column, the new formal proposals of various bodies in the second, notes by the Rapporteur in the third, and the text recommended by the Commission in the fourth. This *texte synoptique* was the work of Briquet, whose arduous labors for the past five years thus made possible the revision of the rules of nomenclature by this Congress. His untiring industry, unfailing patience, uniform courtesy and impartiality, as well as his linguistic facility, won the admiration of all.

Afternoon sessions thereafter, from 3 to 7 or even later, were devoted to the discussions and actions of the *texte synoptique*.

Morning sessions and on some days also afternoon sessions, which were held in the lecture-room of the Engineer-Architects' Club, were devoted to addresses upon special topics. Thus on Tuesday there were six papers on the development of the European flora since the Tertiary period; two introductory, on the geographical problems by Peack (Vienna) and the botanical problems by Engler (Berlin), while Andersson (Stockholm) spoke specially for the Scandinavian peninsula, Weber (Bremen) for the North German lowlands, Drude (Dresden) for the mountainous region of central Germany, and Briquet (Geneva) for the alpine region.

On Thursday the topic was the present position of the doctrine of photosynthesis, Molisch (Prag) speaking of photosynthesis in chlorophyllous and Hueppe (Prag) in chlorophyll-free organisms, Kassowitz (Vienna) giving a short talk on photosynthesis from the standpoint of metabolism. After a brief intermission the general problems of regeneration were discussed by Goebel (Munich), Lopriore (Catania) presenting a more special paper on the effects of wounding on regeneration of stems and roots. In the afternoon there were papers by Arthur (Lafayette) on the classification of the Uredinales; by Istvánfi (Budapest) on the life history of *Botrytis cinerea*, and by Pettkoff (Sofia) on the algal flora of Bulgaria.

On Friday, Scott (Kew) spoke on the fern-like seed plants of the carboniferous flora; Lotsy (Leiden) on the influence of cytology on

taxonomy; and Hochreutiner (Geneva) on the Botanical Garden at Buitenzorg.

In the afternoon and on Saturday papers were mostly ecological: Beck (Prag), "The Significance of the Karstflora upon the Development of the Central European Flora;" Drude (Dresden), "Suggestions for an Agreement upon the Terminology of Phytogeographical Formations, and Terminology Used in the Cartography of Plant Formations;" Wille (Christiania), "Schübeler's Theory as to the Changes which Plants undergo in Acclimatization at Higher Latitudes;" Tanfiljeff (St. Petersburg), "The Russian Steppes;" Tschermak (Vienna), "The Production of New Forms by Crossing;" Adamovic (Belgrade), "Phytogeography of the Balkan Peninsula;" Palacky (Prag), "Genesis of the African Flora;" Kurtz (Cordoba), "The Fossil Flora of Argentina;" Borbás (Klausenburg), "The Stipas of Hungary;" Hua (Paris), "Report on the establishment of a new international organ for the Publication of New Names;" Schindler (Brünn), "Regulatory Processes in the Plant Body in Relation to Cultivation."

On Wednesday a meeting of the Association Internationale des Botanistes was held, at which reports of the treasurer and secretary were presented. The most important action taken, by an overwhelming majority, was the direction of the Executive Committee, as soon as the present contracts permit, to print all *résumés* in type of the same size, abandoning the attempted discrimination. The next meeting will be held in Montpellier in 1908. The new officers are: Wettstein, president; Flahault, vice-president; the present secretary and treasurer were re-elected.

The botanical exposition, under the auspices of this Association, occupied the Orangery at Schönbrunn, the Emperor's summer palace on the outskirts of the city. The horticultural exhibit was open only during the week of the Congress, but the other exhibits remained for two weeks. There was an historical section, comprising books, atlases, original drawings, engravings, portraits, busts, herbarium specimens, instruments, and preparations of historical interest. This portion of the exhibit was limited to Austria, and naturally the most important contributors were the botanical section of the Imperial Museum of Natural History, and the two botanical institutes of the university.

The largest section of the exposition consisted of modern appli-

ances for instruction and research. With many of the instruments demonstrations were given daily (10–12). In this section were shown living cultures of algae, fungi, and bacteria; photographs of plants and plant-formations, and microphotographs of immense variety and all sizes, including many lantern slides; drawings and paintings; wall charts and maps; current books by the publishers; exsiccatae; and apparatus of many kinds (microscopes and their accessories), balances, ovens, and baths, glassware, physiological instruments, seed-control and wood-testing appliances, etc.

Particularly noteworthy in this section was a display of materials actually used in the Realschule and Gymnasia for botanical instruction, "whose purpose," the exhibitors say, "is to put before the eyes of visitors the advance which botanical instruction has made in the last decades. . . . Inasmuch as the phenomena of plant life must be brought close to the interest and understanding of pupils there stands in the foreground of the display the apparatus for conducting experiments in plant physiology, which break the path for the understanding of biological processes. Then come models and preparations for elucidating the anatomical and morphological features. . . ." This exhibit shows clearly how thorough and wise the courses are. The equipment puts to shame all of our high schools and nine-tenths of our colleges.

The unique mechanical balances of Němetz; the living algal cultures of the Biological Station in Vienna; the apparatus and methods of the Imperial Seed-control Station in Vienna, and of the Imperial Forestry Station in Mariabrunn; and the display of pure cultures of fungi by the bureau established for this purpose by the Association Internationale des Botanistes (in Utrecht, in charge of Prof. F. A. F. C. Went), deserves special mention. The attempt of the Association to secure an exhibit of separates and works of many writers was practically a failure, only eleven sending papers. As a whole the exhibition was highly interesting and useful.

The third meeting of the Freie Vereinigung der Systematischen Botaniker und Pflanzengeographen also occurred on Wednesday, at which, in addition to a considerable list of papers, there was held a discussion on the introduction of a uniform nomenclature in phytogeography.

On Friday the agricultural botanists came together in the Imperial Station for seed-control, in the Prater. No papers were read, but

discussions were held on several topics, such as: "Methods of investigating sugar-beet seeds," "Weighing methods in determinations of germinative capacity," "Organization in seed-control stations," "Culture and study of barley," etc.

The actions on nomenclature are too extensive to summarize, and only a few of the more important decisions can be mentioned here. The word *laws* is to disappear, *rules* and *recommendations* taking its place. The rules for nomenclature of "cellular cryptogams," *i e.*, the Bryophyta and Thallophyta, are remanded to a special commission of specialists, which is to present recommendations to the Congress of 1910, to be held at Brussels. In like manner a report on rules for the nomenclature of fossil plants is to be made by a commission of paleobotanists. The word *ordo* (order) displaces *cohors*, recommended by the Commission for a group of families; but the American proposition to substitute *phylum* for *divisio* was lost. The date 1753 Linn. Sp. Plant. ed. 1. was adopted by a vote of 150 to 19. A vote on an article permitting laxity in the application of the rule of priority to generic names, and providing for a list of genera to be maintained *en tous cas*, was 133 yeas, 36 nays. Later, Harms's list of such genera (400 and over) was adopted by a vote of 118 to 37. This list had been referred to a committee composed of Bonnet, Harms, Britton, Prain, and Briquet, and was recommended (by a majority) for adoption. Some amusement was caused by the proposal of two corrections by the author while the motion to adopt was pending.

The proposition to except some old family names for the rule requiring such names to be derived from an important genus was carried by only 101 to 62.

The voting in regard to publication of a new species by plates and exsiccatae was confused, and the article was referred back to the Commission for editing. It is intended to exclude as valid publication *in future* plates without diagnoses, and past plates (without diagnoses) which contain no analytic drawings. Citation in synonymy and accidental mention are also declared invalid as publications. It was agreed (184 to 2) to adopt the compromise reported by a conference committee requiring the name of a section or species when transferred to another genus, or the name of a variety when transferred to another species, to be preserved or *re-established*; but when the rank is changed the preservation of the name is optional,

and if not preserved its later re-establishment is not permissible. This is accompanied by a *recommendation* to preserve the primitive name whenever possible.

The vote on the use of double names (like *Linaria Linaria*) was unexpectedly close; 116 against them and 72 in favor. Generic names differing merely by their last syllable and even by one letter will be retained. Only typographic or orthographic corrections may be made in generic names.

After January, 1908, diagnoses must be written in Latin; so a close vote, 105 to 88, decided on Friday. A vote to reconsider was made on Saturday but was lost, 125 to 56. The metric system is recommended, and it is declared that "the foot, inch, line, pound, ounce, etc., should be rigorously excluded from scientific language." Fathoms, knots, and marine miles likewise fall under the ban. Authors are requested to indicate clearly the scale of magnification of figures.

On the whole the action of the Congress was conservative from the American point of view, yet marks great progress toward a stable nomenclature. Our European friends have not yet grasped the idea of generic types, and the rules relating to genera will doubtless be the next region of advance. When the final editing is accomplished and the new code is available, we may reasonably expect the rules to be generally followed until a further revision is possible.

The work on cryptogams and fossil plants will doubtless be prosecuted with vigor. The Commission of Cryptogams consists of Migula, Lister, Lauterborn, Gomont, Wille, Nordstedt, Wildeman, Sauvageau, DeToni, Chodat, Farlow, Arthur, Magnus, Saccardo, Patouillard, Jaczewski, Marshall-Ward, Vuillemin, Atkinson, Bresadola, Clements, Golenkin, Hua, Malmö, Zahlbruckner, Schiffner, Stephani, Levier, Evans, Cardot, Brotherus, Fleischer, Mrs. Britton, Salmon, and a few others whose names could not be secured. Some others could profitably be added to the list.

The entertainments, excursions, and visits to various institutions were numerous and attractive. A reception by the Emperor was arranged, but the death of Grand Duke Josef on Tuesday estopped that, as well as a reception by the burgomeister at the Rathaus. Various long excursions after the Congress were provided, and all were sufficiently patronized to be undertaken.

The Committee of Organization and the various local committees are to be congratulated on the success of their arrangements. These quinquennial international congresses may now be considered a fixed feature of the botanical world. C. R. B.

A RETROSPECT OF PHARMACY WITH A HISTORY OF AN OLD PHILADELPHIA DRUG HOUSE.

By Samuel Troth.

We are living in an age of rapidity of thought and action; discovery is no longer localized nor limited by national dialect, but is heralded with lightning speed over the globe, translated into all languages and publicly displayed among all peoples.

Thought-interchange through the medium of printed literature, so scarce and highly prized by our grandfathers, has become plenty and commonplace, and our boys and girls are thinking out problems which would have puzzled men of olden time.

Higher education is the plea of the students, and old systems of philosophy are studied with respect to truth rather than revered by reason of antiquity.

New things attract, but only as they lead up to practical advancement, and the community is coming into a keener knowledge of the secrets of nature by applying such new light to the promotion of bodily comfort and mental improvement. Modern civilization is moved by a desire for financial profit, and individual selfishness is alive to such discoveries and improvements as may have a commercial value.

In no country is this more evident than in ours, where wealth has increased to such a degree that property has accumulated faster than population. Institutions of learning have been supported from this surplus, and opportunity is offered of free scholarships and liberal terms for education in the Arts and Sciences to those who wish to learn.

Pharmaceutical knowledge by technical instruction has become a positive science, and old-time charlatanism is shorn of its influence.

Newspaper advertisements like this from the London *Gazette* of 1673 were common to those days:

"These are to give notice that the eminently successful medicine, commonly known by the name of Dr. Goddard's Drops, are now

most faithfully prepared by Dr. C. G., to whom the said medicine and method of using was long since communicated by Thomas Goddard, Esq., nephew to the said Dr. Goddard, to whom alone (except to His Majesty) the whole receipt of making the medicine was communicated. The said medicine having been these twelve months in preparing, is now to be had in St. John's Close, at the House where Dr. Goddard lived and dyed, being the next door to the Star in the Passage to Clerkenwell."

This medicine of Dr. Jonathan Goddard purported to be a preparation of hartshorn with portions of the skull of a criminal who had been hanged, mingled with dried vipers' bodies and other peculiar substances not disclosed. It had an enormous sale and the recipe was sold to King Charles II, of England, for £5,000 sterling.

It is interesting to study history in its relation to scientific colonization along the line of what are termed seats of learning. Cambridge and New Haven became pioneers in college education devoted to the study of general literature, but Philadelphia was the cradle of medicine and pharmacy, and from its colleges have gone out men of power to foster like institutions elsewhere.

The history of pharmacy in Philadelphia is intimately connected with the conditions of settlement in the colony of Pennsylvania. At that time London was the great commercial metropolis, and many of her merchants were associated in business interests with those of Penn's growing city upon the Delaware, so that Philadelphia became the principal mart for English wares, and the drug trade flourished in a fertile soil. Old files of our newspapers picture these conditions as thus set forth:

"Imported in the last vessels and to be sold Wholesale and Retail at the very lowest prices, by

CHARLES OSBORNE,

Druggist from London, at the Golden Pestle, opposite Mr. Joseph Trotter's in Second Street."

"A large assortment of Druggs, chymical and galenical Medicines; also Daffy's Elixir, James' Powders, Bateman's Drops, Godfrey's Cordial, Anderson's Pills, Squire's Elixir, Spirits of Scurvy Grass, Bostock's Elixir, Lockyer's Pills, British Oil, Stoughton's Bitters, with Nipple Glasses, pots, pill-boxes, vials, &ç., &c.

"N. B.—Masters of ships not carrying Surgeons with them may

be furnished with Medicine Chests and Directions. Families living distant from a Doctor may be furnished also with Chests of all sizes at very low rates."

"Townsend Speakman and Christopher Carter, Chymists and Druggists from London, on the north side of Market Street between Second and Third Streets," advertise their goods in detail, adding, "also a small quantity of very fine French plumbs and pruans, Muscatine raisins and Turkey figs."

"Imported and sold by

CHRISTOPHER MARSHALL,

At the sign of the Golden Ball near the Three Tun Tavern, opposite Strawberry Alley in Chestnut Street."

"A fresh and large assortment of drugs, chemicals and galenical medicines, Daffy's Elixir, Bateman's Drops, British Oil, James' fever powders, Stoughton's Bitters, Hooper's female pills, Schwanberg's fever powders, Godfrey's Cordial, and preparations for the Stone and Gravel, fine and common flour of mustard. Also most sorts of oils and colours either for ship or house painting, dry or ready ground, viz., carmine, vermillion, prussian blue, drop lake, masticotes, verdigrease, Dutch, English and rose pinks, white and red lead, yellow oker, Spanish brown, whiting, litherage, Venetian red, lampblack, with varnishes, brushes, tools, gold and silver leaves & shells; with sundry sorts of dye stuffs as madder, ground redwood; likewise

Bristol and London crown glass of most sizes, vials, galley pots, lancets, pill boxes, alum, brimstone, copperas, rosin and glue, with a great many other things too tedious to mention."

Some of Christopher Marshall's bills of lading mention casks of medicines to Silvanus & Timothy Bevan, at London; flour, wheat, corn, bread and pork to Lisbon; fish to Jamaica; 5,025 horns in one invoice to Dublin; linseed oil, turpentine, white lead, beeswax and rum to other ports.

Distinguishing signs of a London character were popular in the drug trade. Say & Bartram, afterwards Isaac & Moses Bartram, "at the Sign of the Bottle and Three Bolt Heads in Second Street a little above the Sign of the George;" and later Isaac Bartram, "Chymist and Druggist is lately moved into Third Street between Market and Arch at the Sign of the Unicorn's Head."

William Drewet Smith, "Late Apothecary to the Pennsylvania Hospital at his store, the Sign of Hippocrates' Head, between Chestnut and Market Streets."

William Smith, "at the Rising Sun in Second Street between Market and Chestnut and next door below Jonathan Zane's."

Sharp & William Delaney, "at Fothergill's Head on the west side of Second Street between Chestnut and Market."

Townsend Speakman, "at the Bell and Dragon, Four doors below the Friends' Meeting House on the west side of Second Street." Samuel Emlen, "at the Golden Heart, High Street." John White, "at the Mortar and Dove on Second Street." William Chancellor, "at the Pestle and Mortar on Market Street opposite the Presbyterian Meeting House." John Sparhawk, "at the Unicorn and Mortar on Market Street between Front and Second. Duffield & Delaney, "at the Boerhave's Head, Second Street near Walnut."

In 1773 Moses Bartram, "in Second Street between Arch and Race, three doors above Thomas Say's and opposite Samuel Miles and Michael Hillegas," in a *nota bene* to his drug advertisement, "wants to purchase a good smart Dutch lad about 13 or 14 years of age."

In 1730 Evan Jones, a druggist, was located on the north side of High Street near Third, at the sign of "Paracelsus' Head." A few years after he sold out to William Shippen and removed to the corner of Letitia Court, where he displayed a "Blue Paracelsus' Head," but subsequently took it down and put up the "Blue Oyntment and Galley Pot."

This same Evan Jones was principal in an affair that was the subject of town-talk and serious results. Daniel Rees, his apprentice, was interested in the current stories of the mysteries of Free Masonry, so Mr. Jones and some friends, from a spirit of fun, offered to show him the character of the initiation ceremonies of the Order. They had him led blindfolded into the cellar of the shop one evening, where the party, disguised as devil's imps with horns and other appropriate insignia, were assembled around a pan of blazing alcohol. When his eyes were uncovered they attempted by their antics to terrify him, and in the scrimmage his clothes caught fire, and he was so badly burned that he died a few days after. This led to a judicial trial for manslaughter and Jones was convicted and sentenced to be officially burnt in the hand, but a lawyer friend of his, a certain John Remington, interceded and procured his pardon.

In England the Church, through the Order of Monks, claimed a right to the monopoly of healing the body as well as the soul. Then came the Guild of Barber-Surgeons, who procured Acts of Parliament giving them special privileges; these were followed by the College of Physicians and the Fraternity of Apothecaries, each attempting to regulate trade relations by laws favorable to their respective interests.

Although the sale of drugs, by the beginning of the nineteenth century, was a leading interest in the general business of this city, there had as yet been no practical co-operative effort to introduce the London idea of guild or fraternity as a trade protection and stimulus.

In Philadelphia the University of Pennsylvania was at this time the leading educational institution. Under the direction of Dr. John Morgan it had introduced a medical department, which may be said to have taken a leading part in the medical teaching in the young Republic. Possibly to increase influence and to forestall others taking advantage of the indifference of the drug trade to its own interest, they instituted a pharmaceutical department, the history of which is given by Dr. George B. Wood, in 1827, as follows:

"The degree of Master of Pharmacy was instituted with the very laudable view of improving the profession of the apothecary, which in this city has assumed an importance far beyond what it possesses in other parts of the United States. Any person is entitled to the degree who shall have served an apprenticeship of at least three

years with a respectable apothecary, and attended two courses of lectures on chemistry and materia medica in the University.

"Advantages would no doubt have accrued from this accession to the original plan of the medical department had it not been superseded by the establishment by the apothecaries themselves of a distinct school, which, being under their own management and directed to the one object of advancing the usefulness and respectability of the profession, is naturally more popular and at least equally efficient."

Here we are given a hint of the difficulties that were to be met by the founders of the College of Pharmacy in combating a rival, which, profiting by the neglect of the drug fraternity, had already inaugurated a pharmaceutical department before any measures had been taken to supersede, as expressed by Dr. Wood.

In this movement Henry Troth and a few leading druggists were most active, and much credit is due him and his brother, Samuel F., for their persistent efforts through the early years of the college in pushing the work and reviving flagging interest.

To the historian belongs the labor, as typified by Scott's "Old Mortality," of restoring the time-worn records of the past, and in this spirit a brief account of an old Philadelphia drug house and its times may be of some interest to a younger generation which is prone to complain of hard work and long hours, by bringing to their view a picture of the greater hardships to which their forbears were subjected.

Henry Troth came from Talbot County, Maryland, in 1811, to serve a five years' apprenticeship with Jeremiah Morris, a retail druggist on the north side of Market Street west of Seventh. At the termination of his apprenticeship he, in partnership with his brother-in-law, Edward Needles, bought the stock and fixtures of Joseph Lehman, who for sixteen years had carried on a thriving drug trade at No. 222 Market Street, south side east of Seventh, the retiring merchant uniting with Peter Lehman at No. 320, between Ninth and Tenth.

Here was established the wholesale drug business under the firm name of Henry Troth & Co., which continued in the Troth family nearly fifty years.

The late war with England had ended, peace was declared, business was booming, profits were large, and by pressure of thrift and economy capital increased.

In 1823 Samuel F. Troth entered the firm, and in 1826 he bought the interest of Edward Needles and the business was continued as Henry Troth & Co. In 1836 they built upon the lot adjoining westward, a five-story building, the highest at that time occupied by any single firm on Market Street. The ground was bought from Moses Cox and was part of the old Hilzheimer property. The vacated building, No. 222, was bought by William Weightman and occupied by George Miller, confectioner.

In the new quarters, No. 224, the business was enlarged, employing an unusual number of apprentices for the times, and, venturing larger operations, soon attained front rank in the wholesale trade of Philadelphia. By care in selection and manufacture they were enabled to maintain the reputation which had been their aim from the beginning, of dealing in none but unadulterated drugs of the best quality in the market, unaided by false statement or exaggerated praise. In this they were also particularly fortunate in the friendship of Mr. George D. Rosengarten, the celebrated chemist, whose noted chemical preparations were in constant demand and commanded the highest prices, so that the Troth label became a mark of integrity wherever their goods were offered for sale.

In 1842 the senior partner died and the firm was changed to Saml. F. Troth & Co. by the association of Wm. P. Troth, the eldest son of Henry, with his uncle.

In 1853 Saml. F. Troth retired and the business was continued as Wm. P. Troth & Co. in connection with a younger brother, Henry M. Troth, who had graduated from the College of Pharmacy in 1851.

In the early days the wholesale druggists compounded many of the officinal articles now turned out from large factories, upon which the apprentices were kept busy in the shop. In a shed back of the old store, No. 224 Market Street, was a large stone mortar, in which the mercurial ointment was made by the comminution of the mercury by a long-handled heavy pestle, the top steadied by a cross-bar with a collar, while the pestle was moved by hand-power, and after a day's work with the mercury, lard and tallow, about 25 pounds of the combination was completed.

A large cask also stood in the shed with the ingredients of sulphate of iron, nut galls, gum arabic, extract of logwood, vinegar and water to form a first-class writing ink.

Then the busy times with other compounds, as opodeldoc, Lee's, Anderson's and Hooper's pills, Dalby's carminative, Wistar's cough lozenges and the various essences, lemon, peppermint, cinnamon, etc.

An old drug label, reproduced on page 425, gives an idea of the peculiar style of advertising, common to popularize preparations put upon the market. It is printed from a copper plate, engraved by Samuel Tiller, one of the best engravers of Philadelphia, and portrays a lady and gentleman in the costume of the period admiring the natural beauty of a cascade, the white foam from the tumbling stream suggestive of the effect which may be expected to follow the "mix which is to be drank immediately," according to the directions attached.

The Troth store for many years became a favorite shop for the practical education of apprentices, numbering among its protégés some who subsequently were counted leading druggists of the city.

A few called to mind were Alexander Dawson, Robert B. Potts, Claudius B. Linn, Clement Cresson, Thomas Mitchell, Peter Troth Wright, Richard M. Kirkbride, James Norris Dixon, John Paul, Joseph Trimble, Armon Davis, Jacob Lybrand Smith, Wistar C. Parsons, Alonzo W. Parsons, Samuel Yarnall Kemp, Samuel Bines and John F. Sheaff.

The block from Sixth to Seventh on Market Street was a very busy location in the early thirties. At the southeast corner of Seventh was the grocery store of Gillespie & Ellmaker and Gillespie & Jones, and at the opposite corner across Seventh, where the bank now stands, was that of Simon Gratz; these were headquarters in that location for the four- and six-horse Conestoga wagon transports to Pittsburg.

Those long, white canvas-covered vehicles, drawn by fine, sturdy horses bedecked with showy harness and sets of open-mouthed clapper, jingling bells attached to the hame tops, were a feature among the old Philadelphia customs still remembered by many yet living, but to the younger generation, accustomed to fast freight transportation, it seems almost inconceivable that our commercial interests could have flourished while dependent upon twenty-one days' merchandise carriage to Pittsburg.

Next to the Gillespie's store on the east was J. K. Eyre, grocery and forwarding house; then came Perry O'Daniel, watchmaker; Henry Troth & Co.; Geo. Miller, confectioner; J. B. Barras, cloth-

ing; Isaac M. Ashton, hats; Ellmaker, Dunn & Co., forwarding house, corner of Decatur Street, the old building still standing with the old-time hoist projecting from the top of the second story into Decatur Street. Across from Decatur was J. Ridgway & Son, clothing; Reeves & Whitaker, nail manufacturers; Meredith Henderson & Co., drugs; Robert Steen & Co., grocers; Red Lion Tavern, W. M. Shewell, shoes; A. Elmes, hats, and Daniel Deal & Co., on the corner of Sixth Street.

Among others on the north side of Market Street in the same block were R. M. Reeve, drugs; Wm. Carman, grocer; Mulford & Alter, grocers; J. B. Rowand, patent medicines; R. P. DeSilver, books; Wm. Wayne, hardware; Peter Wright & Son, china; Saml. Bispham, grocer and forwarding; Wm. Musser, hides, oil and leather; Geo. Steinmetz, brushes, and Watson & Rennels, confectionery.

Around the corner of Market, on the east side of Seventh, there stood, until a few years ago, an old grayish-brown painted brick house, with a peaked roof and garret over the third story. John Stock built the house in 1788. He had been brought from Germany as a lad about 1765 by Christopher Marshall, with whom he served a nine years' apprenticeship in consideration of the cost of his passage to this country. In 1796 Mr. Stock put up another building at the rear, on Decatur Street, then known as Hiltzheimer's Alley, which he used as a paint shop, the store on Seventh Street being devoted to his drug trade.

In 1814 Geo. Gardom, then a lad, entered the employ of Mr. Stock, and in a conversation a few years ago the old man told how his employer often referred to the service with Mr. Marshall, and thought that he had well earned the £18 cost of his passage to America, and although his master had clothed him well he never sent him to school, which he regretted as an unnecessary deprivation, so Gardom, as a joke, wrote these lines and laid them on Mr. Stock's desk:

> Nine years I served
> For £18 and better;
> The clothes I got were good,
> But of learning not a letter."

Mr. Stock died in 1823, and Geo. Gardom bought the building, which he occupied as a drug and paint shop until he died.

Thus looking backward we not only tell a tale of passing interest,

but by such revival we learn from the recital of past conditions the steps by which advancement has been attained through the labor of those who have helped to make it.

The Philadelphia College of Pharmacy, the pioneer in pharmaceutical education, is well worthy of our civic pride, and the old drug house, with its half-century of active life, has been intimately connected with its early years.

The Troth scholarship is a fitting tribute to the work of its proprietors, and a continuous memorial of their fidelity to the college and the profession they honored.

Almost a century has passed since the druggists of Philadelphia, believing that the University of Pennsylvania was attempting interference with their rightful position in the business world, inaugurated the movement that culminated in the establishment of an institution devoted solely to the furtherance of their own profession, and right well has the promise of the founders been fulfilled in the result of eighty odd years of resourceful activity.

To meet and keep pace with this progressive action, the college must face the necessity of increased zeal on the part of its friends, involving an expenditure beyond any heretofore contemplated.

May the spirit of its founders actuate its governors to hold the prestige already gained, and keep their alma mater in the forefront of the profession, is the hope of the writer.

NOTES ON BRITISH PHARMACY.

By F. A. Upsher Smith, Pharmaceutical Chemist.

The forty-second annual meeting of the British Pharmaceutical Conference was held at Brighton from July 24th to 27th. The conference has for its objects the encouragement of pharmaceutical research and the promotion of social intercourse among pharmacists. The mornings and afternoons of two days are devoted to the reading and discussion of papers, and the remainder of the time is given up to enjoyment. On the occasion of the recent conference nearly 300 pharmacists and many ladies from various parts of the kingdom and the Colonies were entertained in lavish fashion by their confrères of Brighton and the neighboring sea-coast town of Eastbourne. A mayoral reception in the beautiful Royal Pavilion,

dances, smoking-concerts, drives and a sea trip to Eastbourne enabled the members to pass an enjoyable time.

The scientific side of the conference was well attended to, and the meetings were presided over by Mr. W. A. H. Naylor, F.I.C., president of the conference. A notable feature of the meetings was the welcome presence of the veteran Dr. John Attfield, F.R.S., after his absence during the last year or two, owing to a severe illness. About twenty papers were read, of which brief notes will now be given.

The Composition of Dentifrices. By Mr. Stanley Read, L.D.S.E.—The researches of Dr. Miller, of Berlin, have proved the presence in the mouth of protective as well as harmful bacteria. From this Mr. Read drew the conclusion that antiseptic substances should not be employed in dentifrices, but it did not appear to find favor with the members of the conference.

The Physiological Standardization of Drugs. By Prof. W. E. Dixon, M.D. (Lond.), M.A. (Cantab).—Professor Dixon dealt with the necessity for standardizing those galenical preparations which do not admit of chemical assay. He showed how commercial drugs vary in strength, and none more so than ergot. He cited the following drugs as suitable for assay by bio-chemical means: The digitalis group, including digitalis, strophanthus and squill; ergot, Indian hemp, lobelia and opium. Professor Dixon criticized adversely the standardization of ergot preparations on the rooster. He preferred injecting ergot into the femoral vein of a frog and observing the blood pressure at the carotid artery. The rise in blood pressure in mammals, due to ergot, is directly proportional to the effect of ergot upon the uterus; whereas the production of gangrene in the comb of a rooster is not so. In the discussion that followed some apprehension was manifested as to the ability of pharmacists to carry out such tests, but Professor Dixon made it clear that such work was quite outside the province of the pharmacist.

The Pharmacy of Capsicum. By Mr. A. W. Gerrard.—The author proved 90 per cent. alcohol to be a better solvent of capsicum than ether, benzine, chloroform and several other organic solvents. He suggested the preparation of a liquid extract (1 grain equals 2 grains powdered capsicum) as the starting point for making capsicum ointment, wool and plaster. Mr. Gerrard's formulæ are here given:

Liquid Extract of Capsicum: Prepared by percolation of capsicum fruit in No. 60 powder, 100 parts with 90 per cent. alcohol, and the liquid distilled until the extract weighs 50 parts.

Ointment of Capsicum: Liquid extract of capsicum, 60 grains; olive oil, 1 ounce; spermaceti, 60 grains. Melt the oil and spermaceti together, stir in the extract, and allow to cool.

Lanolin Ointment of Capsicum: Liquid extract of capsicum, 60 grains; hydrous lanolin, 1 ounce and 60 grains. Melt the lanolin with gentle heat and stir in the extract.

Capsicum Wool: Liquid extract of capsicum, 2 ounces; absorbent cotton in thin sheets, 9 ounces; 90 per cent. alcohol, 7 ounces. Dissolve the extract in the alcohol, soak the cotton with the solution under pressure. Dry the cotton, which should contain 10 per cent. of solid extract. Color with eosin.

Capsicum Plaster: Liquid extract of capsicum, 10 parts; resin plaster, 95 parts. Evaporate the spirit from the extract over a water-bath, then stir it into the melted plaster. Color with dragon's blood.

Other papers read at the conference included: "Compound Tincture of Gentian," by Mr. F. H. Alcock, F.I.C., relating to the variation in amount of total solids, due to the variation in the root.

"Note on the Ash of Myrrh," by the same author.

"Commercial Concentrated Infusions," by Mr. R. A. Cripps, F.I.C., showing the inferiority of concentrated infusions as regards color, taste, odor and extractive, as compared with freshly made infusions.

"Compound Decoction of Aloes," by the same author, pointing out the undesirability of the concentrated form of this preparation, and the deficiency in alcohol of commercial samples.

Standardization in the New U.S.P. By Mr. T. Maben.—Mr. Maben drew attention to the extension of the principle of chemical standardization and compared the figures obtained in this country with standards given in the U.S.P.

Quinine Acid Hydrochloride. By Mr. W. Garsed.—Mr. Garsed drew attention to an important fact that seems to have escaped the attention of manufacturers, viz., that the salt is almost anhydrous.

"The Assay of Compound Tincture of Camphor," by Mr. F. C. J. Bird, pointing to the need for special care in assaying this preparation. The author gave a detailed method for operating on so small

a quantity as 2·5 c.c., for use in legal cases when larger quantities are not available.

"Nux Vomica Seeds," by Mr. Sidney C. Gadd, giving the amount of N / 10 soda required to neutralize the fat in the seeds.

"Manufacture of Ferrous Carbonate," by the same author, describing the manufacture of dry ferrous carbonate, containing 60 per cent. of the ferrous salt.

"Castor Oil" (Part I), a resumé of the chemical literature of the subject, by Mr. H. Finnemore, A.I.C., and Mr. H. Deane, B.Sc., A.I.C.

"Amateur Laboratory Construction," by Mr. Evelyn W. Pollard, B.Sc. A description of cheap forms of home-made apparatus, including a still with an electric alarm to give warning when the still is running dry. This device consists of a metal disc attached to a cork, which acts as a float in the constant level tube. As the water distils the float falls until it reaches another metallic disc, when by means of wires attached to the discs a circuit containing an electric bell and a Leclanché cell is completed and the bell rings.

"Viscosity of Mucilages of Acacia and Tragacanth," by Mr. Edmund White, B.Sc., F.I.C., who finds that the viscosity of a mixture of these gums is less than might have been expected from the proportions of the two gums present. This phenomenon requires further investigation.

"Arsenious Iodide," by Mr. R. C. Cowley and Mr. J. P. Catford, consisting of notes and criticisms on methods of preparing the salt and on the official tests. A method of preparing the salt by direct combination is recommended. The new U.S.P. reproduces an erroneous statement regarding the neutrality of solutions of the salt.

PROGRESS OF PHARMACY.

A QUARTERLY REVIEW OF SOME OF THE MORE INTERESTING LITERATURE RELATING TO PHARMACY AND MATERIA MEDICA.

By M. I. Wilbert,
Apothecary at the German Hospital, Philadelphia.

By far the most important occurrence, during the past three months, from a pharmaceutical point of view, was the publication of the new *eighth decennial revision of the Pharmacopœia of the United States of America.* An exhaustive preliminary review of this publi-

cation has appeared in this JOURNAL (A. J. P., 1905, page 351), and corresponding reviews have been, or are being, published in other pharmaceutical journals. It is gratifying indeed to note the general appreciation of the book, as voiced in the different reviews, and the spirit of unanimity with which the work of the Committee on Revision is being commended.

The general appearance of the book itself, the paper, printing, and the typographical arrangement of the text, have all been highly commended, and in this respect alone the Board of Trustees of the United States Pharmacopœial Convention have amply demonstrated a reason for their existence. The only possible fault that might rightfully be found with the eighth decennial revision of the U.S.P., as a book, is to be noted in connection with the volumes that have been bound in sheep. The shortcomings of this particular type of binding have evidently been brought to the attention of the Secretary of the Board of Trustees, as they are referred to at some length in a circular letter recently sent out. In this same letter, Dr. Motter calls attention to the fact that volumes bound in full flexible leather are much more satisfactory and much more durable than any other form of binding and that they will, in addition, lay perfectly flat and "stay put" at any portion of the book at which it may be opened. At the prescription counter, or in the laboratory, this is a most important feature, and prospective purchasers of the Pharmacopœia will, therefore, do well to remember that the binding in full flexible leather is the most durable as well as the most satisfactory in other respects, and that the sheep-bound book, although intermediate in price, is not satisfactory for every-day use.

Among the numerous pamphlets that have been published descriptive of, or commenting on, the Pharmacopœia, at least two deserve more than passing notice. The first of these to reach us is of English origin: *A Synopsis of the Principal Changes in the United States Pharmacopœia* effected by the Eighth Decennial Revision, 1900, official from September 1, 1905, compared with that of 1890 and the British Pharmacopœia, 1898. By W. Harrison Martindale, Ph.D. Price, 2s.; post free, 2s. 1d. London, Eng.: H. K. Lewis, 136 Gower Street, W. C.

In this very interesting little pamphlet of 36 pages Dr. Martindale has attempted to indicate briefly the most important changes that have been carried out in the eighth decennial revision of the

United States Pharmacopœia, and to compare them with the British Pharmacopœia now in use. That he has succeeded wonderfully well is evidenced by a careful study of the book, or rather booklet, itself, which is to be recommended to all who are in any way interested in the comparative study of existing Pharmacopœias.

The second pamphlet of interest in this connection is: Hygienic Laboratory. Bulletin No. 23, August 1, 1905, entitled: *Changes in the Pharmacopœia of the United States of America*, Eighth Decennial Revision. Official from September 1, 1905. By Reid Hunt and Murray Galt Motter. Washington: Government Printing Office. 1905.

This pamphlet contains a series of interesting comments on the properties and uses of the additions to the Pharmacopœia, also a number of tables relating to the changes in strength of the more important official preparations, a list of the changes in the official Latin titles of pharmacopœial preparations, a list of the articles dismissed from the Pharmacopœia; also a table of average doses, as given by the eighth decennial revision of the Pharmacopœia, and an index. The latter is particularly valuable and refers to a number of allied compounds that are mentioned in the comments on the new additions to the Pharmacopœia.

The fifty-sixth Annual Session of the American Medical Association, held at Portland, Ore., July 10–14, 1905, was of more than usual interest to pharmacists. In point of numbers the meetings were particularly well attended and the papers and other communications presented to the several sections were of the usual high order of merit.

Before the Section on Pharmacology, now changed to Section on Pharmacology and Therapeutics, several papers by members of the American Pharmaceutical Association were read and discussed. Prof. Albert Schneider, of San Francisco, read a paper entiled "Uncertain Origin of Many Drugs;" Prof. William M. Searby, of San Francisco, read a paper on "The U. S. Pharmacopœia—Its Functions;" and Prof. C. S. N. Hallberg, of Chicago, read a paper on "The U. S. Pharmacopœia. Advance in Pharmacy." A resolution endorsing the standards and the orthography of the U.S.P. was also adopted by this section.

In the Section on Practice of Medicine, Dr. Frank Billings, of Chicago, read a paper on "The Secret Nostrum Evil," in which he

contended that the best way to combat, and ultimately to eliminate, the present abuses in this connection was by publicity. Dr. Billings, it appears, is in favor of holding special society meetings to consider the evils of prescribing remedies of unknown composition and also believes that the utmost publicity should be given these proceedings, in order to educate the profession to a due realization of the dangers that are involved. The paper was discussed by Drs. Musser, Moore, Walsh, Stengel and others.

At the close of the discussion Dr. Alfred Stengel, of Philadelphia, presented a set of resolutions calling attention to the prevailing abuses in connection with secret or semi-secret nostrums and endorsing the action of the Board of Trustees of the Association in creating the Council on Pharmacy and Chemistry.

In the House of Delegates the action of the Board of Trustees in relation to the Council on Pharmacy and Chemistry was commended and the work that the Council itself has done was endorsed. (*Jour. Am. Med. Assoc.*, July 22d, page 276.)

Acetanilid Mixtures.—The Council on Pharmacy and Chemistry of the American Medical Association, through its sub-committee on chemistry, has published an official report on acetanilid mixtures. (*Jour. Am. Med. Assoc.*, June 3d, page 1790.)

The direct object in making the investigation was to ascertain the percentage proportion of acetanilid contained in each of the several preparations examined. Diluents and other constituents than those mentioned in the report were not determined. The substances reported on, and their percentage content of the substances mentioned, were:

Ammonal.—Acetanilid, 50; sodium bicarbonate, 25; ammonium carbonate, 20.

Antikamnia.—Acetanilid, 68; caffeine, 5; citric acid, 5; sodium bicarbonate, 20.

Phenalgin.—Acetanilid, 57; sodium bicarbonate, 29; ammonium carbonate, 10.

Salacetin.—Acetanilid, 43; sodium bicarbonate, 21; sodium salicylate, 20.

Kohler's Headache Powder.—Acetanilid, 76; caffeine, 22.

Orangeine.—Acetanilid, 43; sodium bicarbonate, 18; caffeine, 10.

That manufacturers of these compounds may, and actually do, vary the composition of these several mixtures was also evidenced

On page 1791 of the *Journal* it is stated that "Certain packages of phenalgin were purchased which on analysis did not show ammonium carbonate." On page 55 (*Jour. Am. Med. Assoc.*, July 1, 1905) it is stated that the examination of antikamnia and quinine tablets failed to show the presence of sodium bicarbonate, an integral constituent of antikamnia.

The Lewis and Clark Pharmaceutical Congress was held in Portland, Ore., July 12–14th. The several meetings of the Congress, while not particularly well attended, appear to have been satisfactory, and will no doubt prove to have been of material advantage to the progress of pharmacy on the Pacific Coast. A permanent organization was effected at the second session, when the following officers were elected: President, William M. Searby, of San Francisco; Vice-President, J. M. A. Laue, of Portland; Secretary, A. Schneider, of San Francisco; Treasurer, J. H. Dawson, of San Francisco.

The greater number of the *State Pharmaceutical Associations* have held their annual meetings. While it must be admitted that but few of these meetings have contributed much to the advancement of the professional side of pharmacy, they have, by maintaining at least the semblance of an organization in the several States, evidenced a tendency to preserve and to foster a spirit of amity and good-will that must, in the near future, be productive of higher ideals and better results.

The British Pharmaceutical Conference Meeting was held this year at Brighton, July 24–27th. It is rather a singular coincidence that the British Association should choose for its annual meeting place this popular seaside resort, while our own American Pharmaceutical Association, for the first time in its history, is to meet at Atlantic City, the most populous and undoubtedly the most popular seaside resort in America.

The subject matter of the papers read and discussed at the Brighton meeting was, in many ways, indicative of thoughts that are uppermost in the minds of active pharmacists throughout the world.

The President, Mr. W. A. H. Naylor, F.I.C., F.C.S., appears to have had a due appreciation of this widespread interest when he took for the subject matter of his annual address a critical discussion of the objects, aims and probable limitations of standardization.

Standards and Standardization.—In the course of his address on

this subject Mr. Naylor outlined the principles of standardization and also gave a short history of its practical application in Great Britain. After calling attention to a number of processes for standardizing the more popular alkaloidal drugs, he devoted some time to calling attention to the fact that standardized preparations, like all others, are subject to changes that may, and actually do, contribute to the loss of active principles, even when kept under the most favorable circumstances. In this connection he stated that preparations of nux vomica were undoubtedly the most stable while the liquid preparations of ipecac were the most subject to loss of alkaloidal content. Mr. Naylor also called attention to the fact that preparations that are made from standardized drugs may, and frequently do, differ very materially in alkaloidal content, and he therefore considers it unwise to rely absolutely on the alkaloidal indications of the drug without confirming them by a careful assay of the finished product.

At least three additional papers, presented at the Conference meeting, were largely devoted to the same subject. Dr. W. E. Dixon discussed the "Bio-chemical Standardization of Drugs;" Thomas Maben, F.C.S., read a very interesting paper on "Standardization in the new U.S.P.;" and Messrs. Umney and Bennett discussed "The Essential Oils of the United States Pharmacopœia." The latter paper contains a detailed review of the tests and requirements embodied in the several monographs on essential oils in the U.S.P., and is well worth careful perusal, particularly at this time. Dr. Dixon, in his paper on physiological standardization of drugs, argued that this method was altogether as reliable as chemical tests, and in some instances, at least, offered the only satisfactory method by means of which the potency and consequent efficiency of therapeutic preparations could be tested. (The *Pharmaceutical Journal*, July 22, 1905.)

The Metric System of Weights and Measures in Australia.—A bill has been introduced in the Parliament of the Federal Government of Australia which provides that the use of the metric system shall be permissible and that the Governor-General shall have power to make it compulsory at any future date. (*Phar. Jour.*, 1905, page 806.)

The Coming of the Mil.—"The recent announcement that official recognition had been accorded to the proposed new terms for metric measures of capacity—the mil, decimil and centimil—raises fresh

hopes with regard to the prospect of the metric system of weights and measures being generally adopted in course of time for dispensing purposes in England. Those who devised and elaborated the system never had in view the prevailing rule, in English-speaking countries, of 'solids by weight and liquids by measure,' otherwise provisions would doubtless have been made for measuring smaller qantities of liquids than the one-thousandth part of a liter. In that case, we should not have seen the cubic centimeter adopted as a measure of capacity, nor would there have been any temptation to indicate doses of liquid medicaments in unthinkable decimal fractions of a fluid gramme. So long as the dose of Scheele's hydrocyanic acid was given as '0·06 to 0·24 c.c.,' so long would medical practitioners and pharmacists prefer to think and speak of it as '1 to 4 minims,' and there would have been an insurmountable barrier to the use of the metric system by English-speaking prescribers and dispensers. But the coming of the 'mil' alters the position entirely, since that term and those representing fractional parts of the milliliter will adequately and conveniently replace the fluid drachm and the minim. It is to be hoped that the new terms may be used freely in pharmaceutical literature, so that they may become quite familiar before the issue of the next British Pharmacopœia, in which the mil and its fractions will presumably be employed to the exclusion of less accurate denominations." ("GNOMON," in *Phar. Jour.*, July 8, 1905, page 32.)

The British Pharmacopœia.—Dr. Donald Macallister, in his presidential address to the General Medical Council, in referring to the coming revision of the British Pharmacopœia, said: "The Pharmacopœia Committee has decided that it is expedient to appoint committees of reference to advise it on points of chemistry, botany, pharmacology and pharmacy. With the courteous assistance of the pharmaceutical societies of Great Britain and of Ireland a committee of reference in pharmacy has first been appointed. It consists of expert pharmacists, with Mr. Hills as chairman and Professor Greenish as secretary, to whom questions relating to pharmacopœial pharmacy will be referred for investigation and report." (*Phar. Jour.*, 1905, page 795.)

Amalgamation in Great Britain.—The Liverpool Chemists' Association has issued a circular to the chemists of the district stating that it is proposed to amalgamate the Liverpool School of Pharmacy

with the Liverpool University so as to obtain the advantages of the magnificent equipment of the University in addition to the admittedly excellent staff of teachers now connected with the School of Pharmacy. (*Chem. and Drug.*, 1905, page 780.)

That a desire to improve the educational facilities in all branches of learning is still foremost in the minds of a large number of eminent and scholarly men is evidenced by the sentiments expressed by *Dr. William Osler in his farewell address to the medical profession of America.* (*Jour. Am. Med. Assoc.*, Aug. 5, 1905, page 365.)

Unity, Peace and Concord was the text selected by Dr. Osler for this address. In speaking of the things needed to bring about the desired unity in the medical profession he laid considerable stress on the desirability and need of bringing about the consolidation of medical schools. Referring to the changed conditions in methods of instruction, he said: "Within the past twenty-five years conditions have so changed that the tax on the men in charge of the unendowed schools has become ever more burdensome. In the old days of a faculty with seven professors a school with 300 students was a good property, but the introduction of laboratory and practical teaching has so increased the expenses that very little is now left for distribution at the end of the year. The students' fees have not increased proportionately, and only the self-sacrifice and devotion of men who ungrudgingly give their time, and often their means, save a hopeless situation. A fusion of the school is the natural solution of the problem. . . . Even the larger schools of the larger cities could 'pool' their scientific interests to the great advantage of the profession."

Much of what Dr. Osler recommends to the medical schools is equally applicable to schools of pharmacy, and it is safe to say that we will not, in fact cannot, have the much-to-be-desired improvements in the status of pharmacy and of pharmacists until the income of the teachers of pharmacy is, in a large measure at least, entirely independent of the fees paid by students.

Additional Prerequisite Requirement.—The Wisconsin Board of Pharmacy has recently announced that after July 1, 1905, all candidates for examination must submit certificates showing that they have completed at least one year's instruction in a high school, or its equivalent; that after July 1, 1906, they must also submit certificates showing them to have completed one year of at least thirty-two

weeks in a school or college of pharmacy recognized by the Board; and that after July 1, 1907, they must present evidence of having completed a full college course.

Apprentices who were registered with the Board before July 1, 1905, are exempt from these regulations.

The Hanbury Medal, for original research in the natural history and chemistry of drugs, was this year awarded to Professor Ernst Albert Schmidt, the director of the Pharmaceutical Institute of the University of Marburg, a position he has filled for upwards of thirty-one years. (*Phar. Jour.*, 1905, page 863.)

Professor Schmidt is an honorary member of the Philadelphia College of Pharmacy, of the American Pharmaceutical Association, of the Pharmaceutical Society of Great Britain, and of a number of other pharmaceutical and scientific societies. He was awarded the Flückiger medal in 1902, and is generally well known for his contributions on the chemistry of the alkaloids.

Acetyl-Salicylic Acid.—The British patent for this substance was recently declared invalid by Mr. Justice Joyce, who, in handing down his decision, asserted that the specification for the patent was misconceived and therefore misleading. (*Phar. Jour.*, July 15, 1905, page 76.)

Another interesting decision, relating to this same chemical, was recently reported from Hamburg, Germany. Messrs. C. F. Asche & Co. were marketing "Acetylo-salicylic acid, a substitute for aspirin," and were proceeded against by representatives of the Farbwerke A-G vormals Friedrich Bayer & Co., in Elberfeld, for interfering with their rights in the trade-marked name and attempting to mislead the public. In view of the fact that the preparation under consideration was distinctly labelled as not being aspirin and was offered in vials quite distinct from those used for the latter, the court ruled that no fraud was intended and dismissed the case. (*Phar. Zeitg.*, 1905, page 618.)

The Cultivation of Medicinal Plants.—E. M. Holmes, F.L.S., has contributed an interesting series of articles to the *Pharmaceutical Journal* in which he describes the habits and the soil best suited to the growing of various medicinal plants.

In England medicinal plants are grown quite extensively, and, in some sections at least, on a very large scale. The prospects for this year's crops (*Phar. Jour.*, July 29, 1905, page 112) are unusually

good for some drugs, while others, particularly peppermint and lavender, will be below the average.

Rheum Rhaponticum in Chinese Rhubarb.—A. Tschirch (*Schweiz. Wochensch.*, 1905, page 253) describes a ready method for detecting the admixture of Rheum haponticum in other varieties of the drug. This method depends on the insolubility, in ether, of the crystalline principle rhaponticin or ponticin:

Ten grammes of the suspected powder are boiled for fifteen minutes with 50 c.c. of dilute alcohol, the resulting solution is then filtered and concentrated to 10 c.c., this concentrated solution is then mixed with 10 or 15 c.c. of ether and allowed to stand. If rhaponticin is present this will be precipitated as a crystalline deposit. Chinese rhubarb similarly treated gives no deposit.

The Constitution of Barbaloin.—H. A. D. Jowett and C. E. Potter have commenced an investigation of disputed points in connection with the constitution and the empirical formula of barbaloin. They have made a number of analyses of different specimens of carefully purified material, as a result of which they propose the adoption of Tilden's formula for barbaloin, $C_{16}H_{18}O_7$. The authors have been unable to confirm a number of statements made by Leger, in 1902, relating to barbaloin, and are inclined to believe with Oesterle that the work done by Tilden (1872–1875) more nearly indicates the true composition of this substance. (*Chem. and Drug.*, 1905, page 901.)

Hydrastis.—In Europe this rhizome has repeatedly been found to be contaminated, and in some cases undoubtedly wilfully adulterated, by the admixture of one or more of the following: Aristolochia Serpentaria, Leontice thalictroides, Stylophorum diphyllum, Jeffersonia diphylla, Trillium sessiliflorum. (*Zeitschr. d. Allgem. Oest. Apoth. Ver.*, 1905, page 542.)

Reliable Qualitative Test for Sugar.—J. Strassburger gives the following modification of W. S. Himes' test for sugar: Two grammes of pure cupric sulphate are dissolved in 15 c.c. of distilled water, 15 c.c. of glycerin are added, and the whole is then mixed with 150 c.c. of a 5 per cent. solution of potassium hydrate. For use 4 c.c. of this solution are heated to boiling and a few drops of the suspicious urine are added. In case an appreciable amount of sugar is present the characteristic red precipitate is promptly produced. While this reagent is not as sensitive as Fehling's solution it has

the advantage of being comparatively stable. (*Apothek. Zeitg.*, 1905, page 310.)

The Production of Extracts and Tinctures.—The most desirable methods for extracting drugs in the production of extracts and tinctures have received considerable attention recently in the pharmaceutical press of Germany. Among the contributors to the controversy are Dr. J. Herzog, Dr. Bruns, Dr. W. Lenz and others. The present status of the theory and practice of drug exhaustion in Germany has more recently been carefully reviewed in a lengthy article in the *Pharmaceutische Centralhalle* (1905, page 420, *et seq.*) by Dr. J. Katz. In this article the writer devotes considerable space to a critical review of the several methods that have been in use, or that have been suggested from time to time, for the preparation of extracts of organic drugs and practically agrees with Herzog, that, all things considered, percolation offers by far the most satisfactory method for the complete and at the same time economical extraction of drugs.

Acidol.—Betain hydrochloride, a colorless crystalline powder, acid taste and reaction, soluble in 2 parts of water and in 30 parts of 90 per cent. alcohol. Aqueous solutions of acidol are said to hydrolize rapidly and the substance then acts as pure hydrochloric acid. It is indicated as a substitute for hydrochloric acid and on account of its pleasant fruity taste is said to be more readily taken. Acidol may be given in aqueous solution, in tablets or as powder diluted with pepsin or inert materials. Dose, 0.50. (*Phar. Centralh.*, 1905, page 371.)

Indoform.—A white crystalline powder obtained by the action of formaldehyde on acetyl-salicylic acid. Indoform is sparingly soluble in water and has an acid astringent taste. It is decomposed by alkaline solutions, liberating formaldehyde. Indoform has been given in gout, rheumatism and neuralgia, in the form of tablets containing 0.50 of the substance. (*Phar. Centralh.*, 1905, page 316.)

Metakalin.—This name is applied in Germany to what appears to be a cresol soap solution in solid form. Metakalin is said to be composed of 80 parts of a pure metacresol-metacresol potassium combination and 20 parts of a hard soda soap.

When fresh the substance occurs as a white powder, but gradually becomes yellow on keeping. It is soluble in 1 to 2 parts of water, this concentrated solution becomes cloudy on the addition of water,

until from 9 to 10 parts of water have been added, when it again becomes clear. Indicated as a substitute for cresol soap solutions, or lysol. (*Viertel-Jahrschr. f. Pract. Phar.*, 1905, page 110)

Mukogen.—This is said to be the hydrochloride of dimethyl-phenyl-p-ammonium-β oxynaphthoxazin and is produced by the condensation of a dinaphthol with nitrosodimethylamin.

Mukogen occurs in blue crystals that are nearly insoluble in water but soluble in alcohol and in solutions of the alkalies. It is said to act as an aperient and is given in doses of from 0.10 to 0.30. (*Phar. Post.*, 1905, page 332.)

Tacca pinnatifida, the tubers of this plant, belonging to the family Taccaceæ and indigenous to the South Sea Islands and to New Guinea, are said to contain the greatest percentage of starch of any known plant; averaging, according to Wohltmann, as high as 28 per cent. The starch itself occurs in commerce as Tahiti arrow-root, Williams' arrowroot or as Fécula de Pia. (*Phar. Centralh.*, 1905, page 496.)

Petrolatum Ceratum.—P. Van der Wielen proposes the following formulas for petrolatum or vaseline compounds that are said to be capable of taking up, and permanently holding, as much as 75 per cent. of water or of aqueous solutions, and should, therefore, be satisfactory substitutes for adeps lanae.

Petrolatum Ceratum album.—White wax 5, white petrolatum 95.

Petrolatum Ceratum flavum.—Yellow wax 5, petrolatum 95. In either case the wax and the petrolatum are to be melted and subsequently stirred until cold. (*Phar. Weekbld.* through *Apothek. Zeitg.*, 1905, page 516.)

RECENT LITERATURE RELATING TO PHARMACY.

SOME NEW ESSENTIAL OILS

Messrs. Schimmel & Co., in their semi-annual report for April-May, 1905, pp. 82–86, give the result of their examinations of the following oil:

Oil of *Tetranthera polyantha var. citrata* Nees. Of this tree, belonging to the Lauraceæ, which is distributed in tropical Asia, and is known in Java by the name "Ki-lemolo," bark and leaves were sent to us, which we submitted separately to distillation. The oils hereby obtained had a pleasant aroma, and were constituted as follows:

Oil from the bark[1] (yield of oil 81 per cent.). The lemon-yellow oil has a specific gravity of 0·8904, and a rotation a_D, of + 10° 11′; it dissolves in about 1 and more volumes 80 per cent. alcohol. A test showed the oil contains aldehydes, probably a mixture of citral and citronellal (melting point of the napthocinchoninic acid 220° to 225°).

Oil from the leaves (yield of oil 5·42 per cent.): bright-yellow; $d_{15°}$ 0·9042; a_D — 15° 41′; soluble in 2·5 to 3 and more volumes 70 per cent. alcohol. Contrary to the bark oil, the leaf oil appears to contain only citral (melting point of the naphthocinchoninic acid 198° to 200°), whose quantity amounts to about 30 per cent.; in the non-aldehydic portions cineol was detected (melting point of the iodol-compound 111°).

CORRESPONDENCE.

THE U. S. PHARMACOPŒIA.

How the Pharmacopœia is Published.—Prior to the 1890 edition the Committee on Revision of the U.S.P. sought a publisher as would an individual author of a new book. The convention of 1890 made a new departure, and instructed the Committee on Revision to secure the copyright for the revised Pharmacopœia. A contract was made with one firm to print the book, and with another to act as selling agent. The Committee on Revision realized a good profit, which was used in covering the expenses of the work of revision and paying the members a small honorarium. The convention of 1900 inaugurated a new plan by adopting a constitution and by-laws and taking steps which resulted in securing papers of incorporation for the United States Pharmacopœial Convention. The constitution provides for a Board of Trustees of five (with the president of the convention and chairman of the Committee on Revision as *ex-officio* members) in addition to the usual Committee on Revision. To the Board of Trustees is entrusted the transaction of all business, including the publication of the manuscript prepared by the Committee on Revision. The work has now reached that point where some idea can be given of the magnitude of the undertaking.

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[1] On the oil distilled from the fruit of *Tetranthera citrata* Nees, comp. Gildemeister and Hoffmann "The Volatile Oils," p. 405.

The printing began in June, 1904, and progressed steadily until June 17, 1905. At that time an imperfect sample copy was printed in order to obtain measurements for the size of cloth and leather sheets to be used in binding. The first complete unbound copy was furnished June 24th. Then followed cloth-bound copies. The first edition consisted of 10,000 copies. This was printed in two runs; the first of 2,000 copies, and the second, two weeks later, of 8,000 copies. This division of the edition was made in order that the chairman of the Committee on Revision could be notified of typographical and other errors discovered in the 2,000 copies, and have the corrections made in the plates before the 8,000 copies were printed. The chairman states that no serious errors were discovered, but, of course, it was desirable to correct typographical errors, even as small as the omission of a bracket or an apostrophe. The second edition of 5,000 was ordered bound July 21st. A third edition has been printed and will be bound as soon as the distributing agent can give an idea of the styles of binding desired.

Of course, corrections have been made in the plates for each edition as fast as errors were pointed out to the chairman of the committee. The different editions are designated by the serial letter on the printed coupon in the front of the book. "A" designates the first edition of 10,000, "B" the second edition of 5,000, "C" the third edition of 5,000. The fourth edition will bear the letter "D." It is estimated on good authority that at least 20,000 copies will be sold before January 1, 1906. The Board of Trustees will use the profit on these volumes in paying the expenses already incurred, and, as soon as possible, send the members of the Committee on Revision checks for the honorarium voted by the Board of Trustees at the annual meeting in May and announced in the report of that meeting.

Errors in the Pharmacopœia should be reported without delay to Prof. Joseph P. Remington, 1832 Pine Street, Philadelphia, Pa., so that corrections can be made in the plates before another edition is printed. Criticisms and suggestions for the next revision should also be mailed direct to Professor Remington. Requests for permission to use portions of the text of the Pharmacopœia in commentaries, works of reference, text-books and other similar publications should be made direct to the chairman of the Board of Trustees, Charles E. Dohme, Baltimore, Md.

Neither the Board of Trustees, nor the Committee on Revision members have anything to do in their official capacity with the National Formulary. This work is published and revised by the American Pharmaceutical Association, of which Charles Caspari, Jr., Department of Pharmacy, University of Maryland, Baltimore, Md., is the General Secretary.

The convention to arrange for the ninth decennial revision of the Pharmacopœia will be called by the president, Dr. Horatio C. Wood, for May, 1910.

HENRY M. WHELPLEY, *Secretary,*
United States Pharmacopœial Convention.

August 12, 1905.

THE AMERICAN CONFERENCE OF PHARMACEUTICAL FACULTIES.

The American Conference of Pharmaceutical Faculties will hold its sixth annual meeting at Islesworth Hotel, Boardwalk and Virginia Avenue, Atlantic City, N. J., September 5th, at 3 P.M. Visitors are welcome at the meetings with the exception of executive sessions, which are held during the consideration and election of applicants for membership.

Each college is entitled to but one vote in the conference, but there is no limit to the number of delegates which a college can appoint. Credentials should be mailed at once to the secretary, Prof. J. O. Schlotterbeck, Ann Arbor, Mich. The following is the programme as far as arranged. Delegates are especially requested to come prepared to discuss item No. 8.

(1) The President's Address and such discussion as it may cause.

(2) Report of the committee on Dr. McGill's paper ("What Degrees should be Conferred by Colleges of Pharmacy?").

(3) Report of the Executive Committee on an article providing for the withdrawal or expulsion of members.

(4) Proposition to strike out Article 3 of the conditions under the heading "Applications for Membership."

(5) Consideration of minor changes in by-laws.

(6) Vote on application for membership.

(7) Presentation of volunteer papers.

(8) Discussion on the subject, "What the Conference Can and Should Do."

HENRY M. WHELPLEY,
Chairman, Executive Committee,
St. Louis, Mo.

August 12, 1905.

QUALIFICATIONS FOR ADMISSION TO AND MEMBERSHIP IN THE AMERICAN CONFERENCE OF PHARMACEUTICAL FACULTIES.[1]

At the meeting of the American Conference of Pharmaceutical Faculties, held on Thursday evening, September 8, 1904, the report of the Executive Committee contained a series of articles defining the qualifications for membership in the Conference. Each article was considered separately and all were subject to considerable discussion, the purport of which was to so word each article as to make the qualifications definite and acceptable to all. Each article was finally adopted without dissent. The articles in detail are as follows:

(1) The institution shall be incorporated as a college or school of pharmacy, or be a department of a regularly-incorporated educational institution, or a department of a State university, or conducted by an incorporated pharmaceutical society.

(2) The school or college shall have been in continuous operation in America for at least five years prior to the date of application for membership in the conference.

(3) The institution shall include in its courses of instruction oral lectures, personal laboratory work, recitations and reviews. This shall exclude work in absentia.

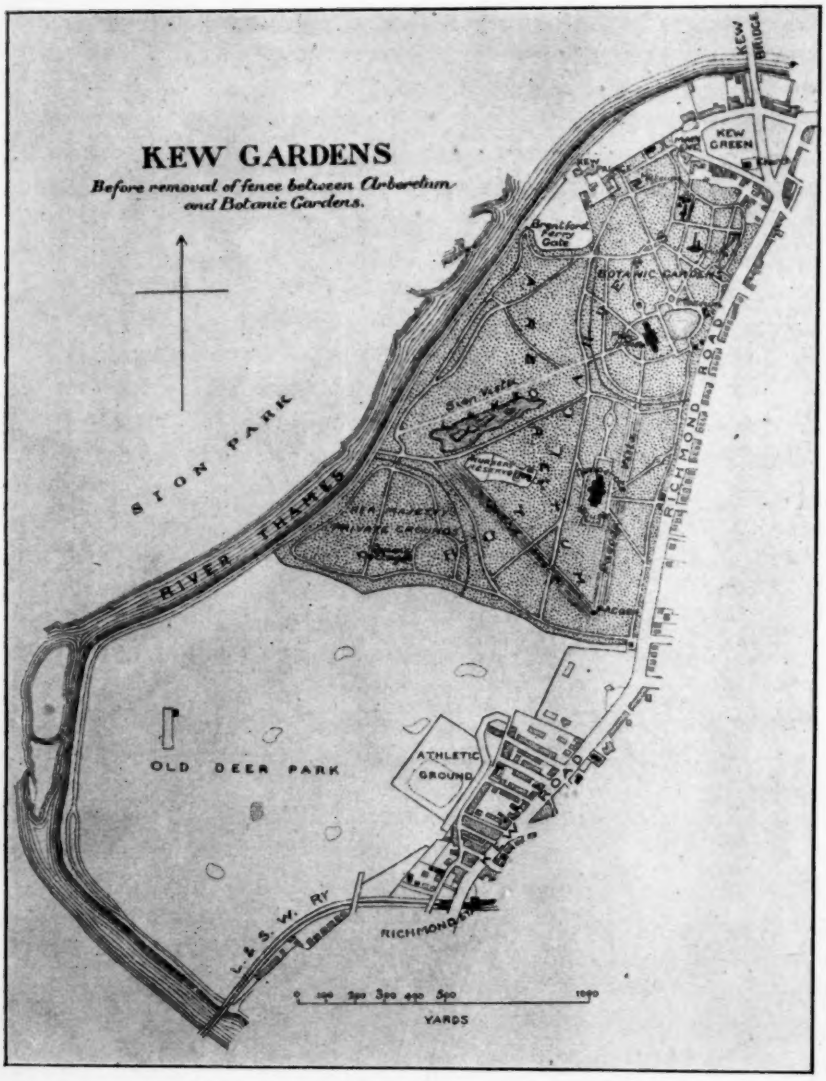
(4) The institution shall require of each candidate for graduation not less than 500 hours given to lectures and recitations, and not less that 600 hours of laboratory work, such work to be given in a period of not less that forty weeks.

(5) The requirements for admission of students to the school or college shall be (1) a minimum age of seventeen years, unless the candidate is a high-school graduate or possesses an equivalent education.

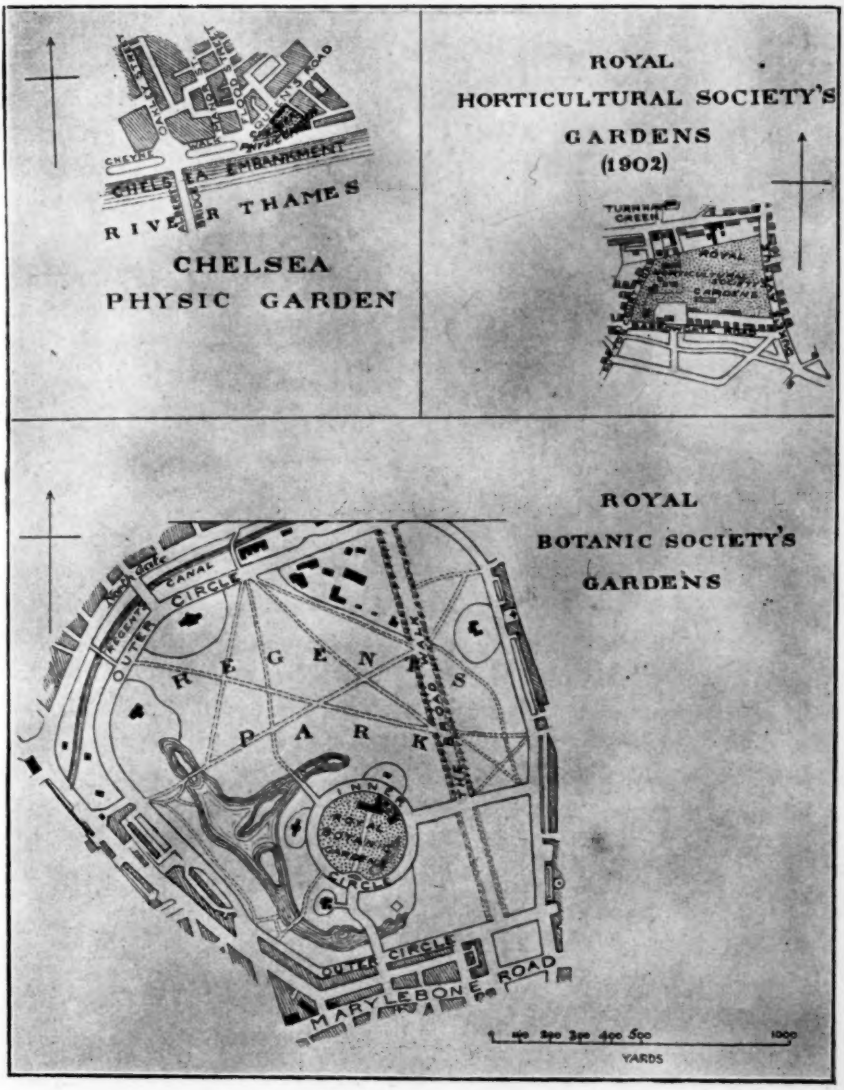
(6) If the information furnished by the applicant be regarded as sufficient to warrant, the chairman of the executive committee shall appoint a Committee of Visitation, consisting of three representatives of the conference, who shall visit such institution, shall inspect the equipment and method of instruction, and report their findings to the chairman of the Executive Committee.

WILBUR L. SCOVILLE,
Secretary.

[1] Abstract of Minutes.



PLAN OF KEW GARDENS AND IMMEDIATE SURROUNDINGS, IN 1895.
NOTE.—*The dotted area represents the gardens themselves.*



The CHELSEA PHYSIC GARDEN, the ROYAL BOTANIC SOCIETY'S GARDENS, and the FORMER GARDENS of the HORTICULTURAL SOCIETY at Chiswick, and their environs, on the SAME SCALE as Kew Gardens in Plate I.

NOTE.—*The dotted areas represent the gardens themselves.*